

which lasts several days. During this period the injections are discontinued. Intravenous injections should begin with small doses of the filtered cultures. They are well-tolerated, and only produce a slight elevation of temperature. After each injection there are trembling and dyspnoea. Care must be taken not to inject outside of the vein. Five or six months after the beginning of the treatment injections with living cultures may be attempted. The production of immunity is in any case a slow and painstaking matter. He kept up the vaccination so long that some of the animals could be considered as hyper-vaccinated. One c.c. of the serum of a guinea-pig so inoculated was effective when injected twenty-four hours before a fatal dose of the virus. Of twenty-six guinea-pigs inoculated with the virus, twenty were treated with serum; six not. The six died in six to twelve days; of the twenty treated, three died between the tenth and sixteenth day. The dog-serum was strong. It gave the phenomena of agglutination to a marked degree. The efficacy of the serum of the dog does not seem due to antitoxic properties. The preventive action is more efficacious than the curative action. Ill success was met with in the production of horse-serum—two of the horses dying. A third horse gave a serum which was feeble.

[The sera were only tried with the guinea-pig—an animal which is rather resistant to the virus—and the results obtained, though interesting, do not give much hope for the application of serum-therapy against the disease.]

Staining of Müller's Granules.—NICHOLLS (*Philadelphia Medical Journal*, February 26, 1898) reports the successful staining of the "dust bodies" of the blood, first described by Müller in 1896. His method consists in adding minute quantities of Ehrlich's neutrophile stain to 0.5 per cent. saline solution and allowing it to flow under a cover-slip of fresh blood sealed with vaseline. Eosine added in the same way stains the large granules. This he considered as completing the chain of evidence necessary to prove the theory of Stokes and Wegfarth.

The Presence in the Blood of Free Granules Derived from Leucocytes, and their Possible Relations to Immunity.—STOKES and ARTHUR WEGFARTH (*Johns Hopkins Hospital Bulletin*, December, 1897) refer to the observations of Müller, who described small round colorless bodies as constantly present in the blood of both healthy and diseased persons. Müller did not attempt to explain the origin or composition of these bodies. The authors were able to demonstrate the presence of such bodies in blood taken from the lobe of the ear in 500 individuals, of whom 100 were healthy. They found the granules were most easily seen in artificial light obtained from a Welsbach burner. The granules are increased in number by the addition of dilute solutions of acetic acid to the blood, and they are believed to come from the granular leucocytes of the blood, either the oxyphile or the eosinophile. A number of observations have shown that the bactericidal powers of the blood-serum are diminished when it is collected without leucocytes, and that such serum may be made bactericidal by the addition of leucocytes. The authors filtered dog-serum through porcelain filters, and found a decided difference in the bactericidal powers of the serum before and after filtration. The unfiltered serum produced agglutination in the cholera, Finkler-Prior,

and typhoid bacilli in from fifteen to twenty minutes, and the filtered serum showed no action in three hours. The filtered serum had no action on the same organisms, while the unfiltered destroyed them. They were not able to perfectly restore the bactericidal action of the filtered serum by the addition of leucocytes containing the granules. They advance the theory that the bactericidal power of the leucocytes of the blood, and of the serum of man and many animals is due to the presence of specific granules, especially the eosinophilic and the neutrophilic. When called upon to resist the action of invading bacteria the granular leucocytes can give up their granules to the surrounding fluids or tissues.

Miliary Tuberculosis.—RIBBERT (*Deut. med. Woch.*, December 30, 1897) replies to Weigert's criticisms of Wild's conclusions with regard to the occurrence of miliary tuberculosis. Wild does not accept Weigert's doctrine that all the bacilli necessary for the production of miliary tuberculosis are derived from tubercles of veins or lymph vessels, regarding it as highly improbable that such great numbers as must be required for this could enter through a lesion so slight as in most cases to be invisible macroscopically. To Weigert's objection that in some cases but few or no tubercle bacilli may be found in the blood, Ribbert replies that he believes with Wysokowitsch, that the bacilli may disappear from the blood, multiply in the organs to which they have been carried, and later again enter the circulation. Ribbert believes that the multiplication of the tubercle bacilli in the blood is dependent upon various conditions: a high degree of toxicity of the bacilli, diminution of the resistance of the invaded organisms, and predisposition. He holds that the connection between tuberculosis of veins or lymph vessels and miliary tuberculosis, in the sense that all the bacilli necessary for the general infection come from one point of entrance, is not proven, and that in most cases only a few enter the blood. He believes that proliferation of the bacilli takes place in the blood under certain conditions in those individuals who are predisposed, and in others whose resistance has become diminished.

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